IN THE CLAIMS

Please amend the claims as follows:

1. (Original) A process of etching a ball-limiting metallurgy (BLM) stack comprising: etching a BLM stack disposed over a metallization, in the presence of a nitrogen-containing heterocyclic compound, an ammonium hydroxide compound, an oxidizer, and a metal halide compound.

2. (Original) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, and wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state.

3. (Original) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, and wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include a pH range from about 7 to about 12.

4. (Original) The process according to claim 1, wherein the nitrogen-containing heterocyclic compound is selected from pyrrole, imidazole, oxazole, thizole, pyrazole, 3-pyrroline, pyrrolidine, and n-methyl pyrrolidone.

5. (Original) The process according to claim 1, wherein the ammonium hydroxide compound is selected from methyl ammonium hydroxide and tetra methyl ammonium hydroxide.

6. (Original) The process according to claim 1, wherein the oxidizer is selected from ozone, hydrogen peroxide, and hydrogen peroxide-containing complexes.

7. (Previously Presented) The process according to claim 1, wherein the metal halide compound is selected from alkali metal halide salts and alkaline earth metal halide salts.

8. (Original) The process according to claim 1, wherein the nitrogen-containing heterocyclic compound includes n-methyl pyrrolidone, wherein the ammonium hydroxide compound includes tetra methyl ammonium hydroxide, wherein the oxidizer includes hydrogen peroxide, and wherein the metal halide compound includes potassium fluoride.

9. (Original) The process according to claim 1, wherein the metal stack includes a refractory metal first layer, a lead/tin barrier second layer, a refractory metal third layer, and a nickel-vanadium upper layer, and wherein etching further includes:
etching the nickel-vanadium upper layer in a first etch; and
etching the first-through third layers in the presence of the nitrogen-containing heterocyclic compound, the ammonium hydroxide compound, the oxidizer, and the metal halide compound.

10. (Currently amended) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the nitrogen-containing heterocyclic compound is n-methyl pyrrolidone (NMP), wherein the ammonium hydroxide compound is tetra methyl ammonium hydroxide (TMAH), wherein the oxidizer is hydrogen peroxide (H_2O_2), wherein the metal halide compound is potassium fluoride, and wherein the conditions include NMP:TMAH:H_2O_2 in a volume ratio:

that varies the NMP from about 8:5:2 to about 2:5:2;
that varies the TMAH from about 5:6:2 to about 5:4:2; and
that varies the H_2O_2 from about 5:5:3 to about 5:5:1.

11. (Original) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include the

metal halide compound that includes potassium fluoride in a range from about 3 gram/liter to about 5 gram/liter.

12. (Original) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include maintaining a temperature in a range from about 25° C to about 50° C.

13. (Original) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include an etch time in a range from about 30 seconds to about 20 minutes.

14. (Original) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include:

NMP:TMAH:H_2O_2 in a volume ratio of about 5:5:2;

KF in a concentration of about 4 g/liter;

an etchant temperature of about 40° C; and

an etch time of about 10 minutes.

15. - 27. (Cancelled)

Please add the following new claims:

28. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, and wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include a pH range from about 9 to about 11.

29. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the nitrogen-containing heterocyclic compound is n-methyl pyrrolidone (NMP), wherein the ammonium hydroxide compound is tetra methyl ammonium hydroxide (TMAH), wherein the oxidizer is hydrogen peroxide (H_2O_2), wherein the metal halide compound is potassium fluoride, and wherein the conditions include NMP:TMAH:H_2O_2 in a volume ratio that varies the NMP from about 8:5:2 to about 2:5:2.

30. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the nitrogen-containing heterocyclic compound is n-methyl pyrrolidone (NMP), wherein the ammonium hydroxide compound is tetra methyl ammonium hydroxide (TMAH), wherein the oxidizer is hydrogen peroxide (H_2O_2), wherein the metal halide compound is potassium fluoride, and wherein the conditions include NMP:TMAH:H_2O_2 in a volume ratio that varies the TMAH from about 5:6:2 to about 5:4:2.

31. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the nitrogen-containing heterocyclic compound is n-methyl pyrrolidone (NMP), wherein the ammonium hydroxide compound is tetra methyl ammonium hydroxide (TMAH), wherein the oxidizer is hydrogen peroxide (H_2O_2), wherein the metal halide compound is potassium fluoride, and wherein the conditions include NMP:TMAH:H_2O_2 in a volume ratio that varies the H_2O_2 from about 5:5:3 to about 5:5:1.

32. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the nitrogen-containing heterocyclic compound is

n-methyl pyrrolidone (NMP), wherein the ammonium hydroxide compound is tetra methyl ammonium hydroxide (TMAH), wherein the oxidizer is hydrogen peroxide (H_2O_2), wherein the metal halide compound is potassium fluoride, and wherein the conditions include NMP:TMAH:H_2O_2 in a volume ratio of the TMAH of about 5:5:2.

33. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include a 100% NMP composition provided in a ratio of about 5 volume parts NMP to 2 volume parts ammonium hydroxide compound, to about 2 volume parts oxidizer.

34. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, and wherein the conditions include an ammonium hydroxide compound of 25% TMAH in water that is provided in a ratio of about 2 volume parts to about 5 volume parts nitrogen-containing heterocyclic compound, to about 2 volume parts oxidizer.

35. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the conditions include a 30% hydrogen peroxide in water that is provided in a ratio of about 2 volume parts hydrogen peroxide to about 5 volume parts nitrogen-containing heterocyclic compound to about 2 volume parts ammonium hydroxide compound.

36. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the conditions include the metal halide compound

that includes potassium fluoride in a range from about 3 gram/liter to about 5 gram/liter and maintaining a temperature in a range from about 25° C to about 50° C.

37. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the conditions include the metal halide compound that includes potassium fluoride in a range from about 3 gram/liter to about 5 gram/liter and an etch time in a range from about 30 seconds to about 20 minutes.

38. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the conditions include maintaining a temperature in a range from about 25° C to about 50° C and an etch time in a range from about 30 seconds to about 20 minutes.

39. (New) The process according to claim 1, wherein etching forms a dissolved portion of the metallization, wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state, wherein the conditions include the metal halide compound that includes potassium fluoride in a range from about 3 gram/liter to about 5 gram/liter, wherein the conditions include maintaining a temperature in a range from about 25° C to about 50° C, and an etch time in a range from about 30 seconds to about 20 minutes.

40. (New) A process of etching a ball-limiting metallurgy (BLM) stack comprising:

etching a BLM stack disposed over a metallization, in the presence of a nitrogen-containing heterocyclic compound, an ammonium hydroxide compound, an oxidizer, and a metal halide compound, wherein the a BLM stack includes:

a metal first layer disposed above and on the metallization pad;

a metal second layer disposed above and on the metal first layer; and

a metal upper layer disposed above the metal second layer; and

wherein etching is carried out under conditions that retain the dissolved portion of metallization in an oxidized state.

41. (New) The process of claim 40, wherein the metal halide compound is present in an amount from about 0.05 to about 0.1 mole KF/liter or about 0.05 to about 0.1 mole equivalents of KF/liter, wherein the conditions include maintaining a temperature in a range from about 25° C to about 50° C, and an etch time in a range from about 30 seconds to about 20 minutes.

42. (New) The process of claim 41, wherein etching includes first etching into the metal upper layer including a nickel vanadium alloy, second etching into a metal third layer including titanium, third etching into the metal second layer including aluminum, and fourth etching into the metal first layer including titanium.

43. (New) The process of claim 41, wherein etching includes first etching into the metal upper layer including a nitrided nickel vanadium alloy, second etching into a metal third layer including titanium, third etching into the metal second layer including a metal selected from titanium doped titanium, and titanium/tungsten, and fourth etching into the metal first layer including titanium.